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13. ABSTRACT (Maximum 100 words)

The research deals with the evaluation of category-based arguments, which have the form: "Some members of of category C have property P. Therefore other (all) members of category C have property P." We have emphasized tasks in which the categories are familiar ones, like "lions," the properties are relatively familiar, like "have skins that are resistant to penetration," and the subject's task is to judge the probability that the conclusion is true given that the premises are. A sample item is: "house cats have skins that are resistant to penetration. Therefore, lions have skins that are resistant to penetration." In the last year, we have performed three experiments using tasks like this. Our major findings are that judged probability increases with (a) the similarity of the premise category to the conclusion category (the similarity of house cats to lions in the preceding example), and (b) the implausibility of the premise. We have developed a mathematical model of such probability judgments, which incorporates the factors of premise-conclusion similarity and premise plausibility, and which provides accurate quantitative predictions of the data. In related work, we have investigated category-based arguments that contain unfamiliar properties, such as "has sesamoid bones." In such cases, similarity factors dominate.

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"Development and Application of a Model of
Individual Decision Making in Military Contexts"

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Our research deals with the evaluation of category-based arguments, which have the following form:

<u>Some members of Category C have Property P</u>

Therefore other (all) members of Category C have Property P.

We have emphasized cases in which the categories are familiar ones, like "lions", the properties or predicates are familiar enough to reason about, like "have skins that are more resistant to penetration than most synthetic fibers", and the subject's task is to judge the probability that the conclusion is true given that the premises are true. A sample item is:
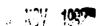
Housecats have skins that are more resistant to penetration than most <u>synthetic fibers</u>

Therefore Lions have skins that are more resistant to penetration than most synthetic fibers

In the last year of the grant period, we refined a model of category-based judgments that we developed in the previous year. The model makes the following assumptions:

(1) Each category is represented by a set of attributes and values. The predicate (e.g., "have skins...more resistant...") potentiates a subset of the premise category's attributes (e.g., size), and is then associated with these attributes and values on them.

(2) The premise category (e.g., "Housecat") is evaluated to see if its values on the relevant attributes are at least as great as those assumed to characterize the predicate.

(3) If the premise category's values are less than those of the predicate (e.g., housecat's size is less than that of the predicate), the latter are scaled down. The predicate is modified in this manner to the extent the premise category is similar to the conclusion category. In cases where the premise category's values are equal to or greater than those of the predicate's, there is no modification of the predicate.

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(4) To the extent the predicate's values are scaled down, the conclusion category's values are more likely to be at least as great as those of the predicate and hence the conclusion is likely to be judged more probable. The upshot of these assumptions is that, the more implausible the premise and the more similar the premise and conclusion categories, the greater the modification of the predicate and the more probable the conclusion.

We completed three experiments this past year to test the above model. One study found support for the major qualitative assumptions of the model; the judged probability of a category-based argument increased with both the implausibility of the premise and the similarity of the premise and conclusion categories. A second experiment showed that a quantitative version of the model could satisfactorily fit the data of individual subjects. In a third experiment, in addition to arguments in which the categories varied but the predicate remained constant, subjects also evaluated arguments in which the categories were fixed but the predicate varied. The result of this experiment were consistent with a minor variation of the model.

The preceding deals with arguments in which the predicates are familiar enough to reason about. Some of our work during the grant period also dealt with category-based arguments in which the predicates were unfamiliar and unlikely to enter the reasoning process, predicate like "has sesamoid bones." In one project, we showed that many of the phenomena that have previously been found with adults also obtained with subjects as young as 7-year olds; this indicates that the strategies that people use to evaluate category-based arguments are natural ones rather than the products of schooling. In another paper, we showed that the standard phenomena obtained with unfamiliar predicates are more readily explained in terms of a similarity-based model than in terms of models that invoke rules or explanations. All in all, our research documents the importance of similarity and plausibility computations in reasoning.

Articles

Smith, E.E., Lopez, A., & Osherson, D.N. (1992). Category membership, similarity, and naive induction. In A. Healy, S. Kosslyn, & R. Shiffrin (Eds). From learning processes to cognitive processes. Vol. 2. Hillsdale, NJ:Erlbaum Press.

Lopez, A., Gunthil, G., Gelman, S.A., & Smith, E.E. (1992, in press). The development of category based induction. Child Development.

Osherson, D.N., Smith, E.E., Myers, T.S., Shafir, E.B., & Stob, M. (1992).
Extrapolating human probability judgment. Submitted to <u>Theory and Decision</u>.

Smith, E.E., Shafir, E.B., & Osherson, D.N. (1992) Similarity, Plausibility, and judgments of probability. Submitted to <u>Cognition</u>.

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<u>Interactions</u>

Papers on "Similarity, Plausibility, and Judgments of Category Based Arguments" presented by E.E. Smith at: Fordham University (7/91), Cognitive Science Society Meetings (University of Chicago, 8/91), McGill University (3/92), and Northwestern University (5/92).